

REMARKS

Claims 1-23 are currently pending in the subject application and are presently under consideration. A marked-up version of all pending claims is found at pages 4-8 of this Reply. Claims 1, 7, 8, 11, 12, 14, 17, 18, and 22 have been amended herein. Claims 2-6 and 19-21 have been cancelled herein.

The specification has been amended herein. Marked-up versions of amended specification paragraphs can be found at pages 2-3 of this Reply.

Applicants' representative notes with appreciation the Examiner's indication that claims 6 and 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Independent claim 1 has been amended herein to recite the limitations of claim 6 and all intervening claims. Similarly, independent claim 22 has been amended herein to recite the allowable limitations of claims 6 and 21. Therefore, it is believed that independent claims 1 and 22, and claims 7-18 which depend respectively there from, are now in condition for allowance.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

**I. Objection to the Drawings**

The drawings are objected to for certain informalities and have been amended herein to correct such informalities in accordance with the Examiner's suggestions. Replacement drawing sheets for Figures 1, 2, 5A, 5B, and 6B are attached hereto following the last page of this Reply, as required by 37 C.F.R. §1.84. Specifically, Figures 1, 2, 5A, and 5B have been amended to include a designation as "Prior Art." In Figure 6B, "2500 RPM" has been changed to "4500 RPM." It is believed that the drawings are now in complete compliance with MPEP §608.02(g). Therefore, it is respectfully requested that this objection be withdrawn.

**II. Objections to the Specification**

The specification is objected to due to certain informalities. The subject informalities have been corrected herein in accordance with the Examiner's suggestions.

Marked-up versions of the amended specification paragraphs can be found at pages 2-3 of this Reply. In view of such amendments, withdrawal of these objections is respectfully requested.

### **III. Claim Objections**

Claims 8, 12, 14, and 18 are objected to for grammatical informalities. The subject claims have been amended herein to comply with the Examiner's suggestions. Specifically, the phrase "at speed" has been amended to read "at a speed." Therefore, it is respectfully requested that this objection be withdrawn.

### **IV. Rejection of Claims 2-12, 17-19, and 22 Under 35 U.S.C. §112**

Claims 2-12, 17-19, and 22 stand rejected under 35 U.S.C. §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 2-6 and 19 have been cancelled herein. The remaining subject claims have been amended herein in accordance with the Examiner's suggestions and are now believed to be in full compliance with 35 U.S.C. §112. Therefore, withdrawal of this rejection is respectfully requested.

### **V. Rejection of Claims 1-3 and 19 Under 35 U.S.C. §102(b)**

Claims 1-3 and 19 stand rejected under 35 U.S.C. §102(b) as being anticipated by Palmer (U.S. 4,768,291). Withdrawal of this rejection is respectfully requested for at least the following reasons. Claims 2, 3, and 19 have been cancelled herein. Palmer does not disclose each and every element set forth in claim 1.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ 2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The present invention relates to semiconductor manufacturing and more particularly to methods and systems for controlling resist residue defects at polysilicon gate layers in a semiconductor device manufacturing process. Independent claim 1 has been amended to recite in part "performing a special vapor prime operation to a semiconductor substrate structure, wherein the special vapor prime operation comprises using a hexamethyldisilazane priming agent and is *performed at a temperature between about 85 degrees C and 130 degrees C for a period of between about 5 seconds and about 20 seconds*; ... [and] performing a special development operation on the first portion of the photoresist using a developer and *maintaining an exhaust air velocity from about 5 meters per second or more to about 6 meters per second or less*;

As stated by the Examiner in the Office Action dated June 27, 2003, the specific exhaust air velocity range of about 5 meters per second to about 6 meters per second is distinguished over the prior art, which does not teach this specific range for exhaust air velocity during spin developing. Therefore, the rejection of independent claim 1 should be withdrawn.

**VI. Rejection of Claims 4, 20, and 22 Under 35 U.S.C. § 103(a)**

Claims 4, 20, and 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Palmer in view of Peterson *et al.* (U.S. 5,429,673). This rejection should be withdrawn for at least the following reasons. Claims 4 and 20 have been cancelled herein. Neither Palmer nor Peterson *et al.*, alone or in combination, teach or suggest each and every limitation of the present invention as set forth in independent claim 22.

To reject claims in an application under § 103, an examiner must establish a *prima facie* case of obviousness. A *prima facie* case of obviousness is established by a showing of three basic criteria. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. See MPEP § 706.02(j). The teaching or suggestion to make the claimed combination and the reasonable expectation of

success must both be found in the prior art and not based on applicant's disclosure. See *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 22 has been amended to recite, "A vapor prime operation for a semiconductor manufacturing process, comprising: priming a semiconductor structure using a hexamethyldisilazane priming agent at a temperature from about 85 degrees C or more to about 130 degrees C or less for a time period from about 5 seconds or more to about 20 seconds or less; applying a photoresist coat to the semiconductor substrate structure; selectively exposing a first portion of the photoresist coat using an exposure source and a photomask, wherein a second portion of the photoresist is unexposed; and performing a special development operation on the first portion of the photoresist using a developer and *maintaining an exhaust air velocity from about 5 meters per second or more to about 6 meters per second or less.*" As discussed above, the cited references do not teach maintaining an exhaust air velocity of between about 5 and 6 meters per second.

In view of at least the above, it is readily apparent that independent claim 22 is not made obvious by Palmer or Peterson *et al.*, either alone or in combination. Therefore, withdrawal of this rejection is respectfully requested.

**VII. Rejection of Claim 5 Under 35 U.S.C. § 103(a)**

Claim 5 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Palmer in view of Peterson *et al.* and further in view of Erhardt *et al.* ("*An Investigation of Circular Resist Residue Defects in the Development of a 0.16  $\mu$ m Flash Process*", cited as prior art in applicant's IDS of Paper #2, filed 04 April 2002). In view of the cancellation of claim 5 herein, it is respectfully submitted that this rejection is moot.

**VIII. Rejection of Claims 7-18 and 23 Under 35 U.S.C. § 103(a)**

Claims 7-18 and 23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Palmer in view of Peterson *et al.*, further in view of Erhardt *et al.*, further in view of Ebersole (U.S. 5,324,620), and further in view of Orth (U.S. 5,50,317). This rejection should be withdrawn for at least the following reasons. The cited references, taken alone or in

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combination, do not teach or suggest each and every element of applicants' invention as set forth in the subject claims.

Specifically, claims 7-18 depend from currently amended independent claim 1, which is not anticipated or made obvious by Palmer, as stated above in Section V. Claim 23 recites "A development operation for a semiconductor manufacturing process, comprising: dispensing developer onto a semiconductor substrate structure; *rinsing front and back sides of the semiconductor substrate structure* while spinning the semiconductor substrate structure at a medium speed for a first time period; rinsing the *front and back* sides of the semiconductor substrate structure while spinning the semiconductor substrate structure at a low speed for a second time period; rinsing the front side of the semiconductor substrate structure for a third time period; and drying the semiconductor substrate structure while spinning the semiconductor substrate structure at a high speed." Such aspects of claim 23 are not made obvious by the cited references.

The numerous references required by the Examiner to form the basis of the present rejection are an indication of the non-obviousness of applicants' invention as set forth by independent claim 23. However, the cited references still fail to teach or suggest each and every aspect of the claimed invention. Specifically, neither Palmer nor Peterson *et al.* nor Erhardt *et al.* teach or suggest rinsing the front and back sides of a semiconductor substrate structure, as set forth in claim 23. Ebersole fails to overcome such deficiencies of the above-mentioned references. Ebersole describes a 20-second deionized water rinse at 1,000 RPM of a wafer *disposed on a vacuum chuck*. (Column 23, lines 28-36) It would be impossible to rinse the back side of the wafer described by Ebersole (e.g., the side of the wafer suctioned to the chuck) while it is affixed to the chuck *via a vacuum*.

For at least the reasons stated above, it is submitted that the cited references, taken alone or in combination, do not make obvious applicants' invention as set forth in independent claim 23. Therefore, it is respectfully requested that this rejection be withdrawn.

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CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063.

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

AMIN & TUROCY, LLP



John M. Ling  
Reg. No. 51,216

AMIN & TUROCY, LLP  
24<sup>TH</sup> Floor, National City Center  
1900 E. 9<sup>TH</sup> Street  
Cleveland, Ohio 44114  
Telephone (216) 696-8730  
Facsimile (216) 696-8731

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